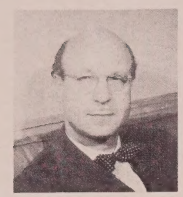
Motorola
newsgram
Bi-Monthly Publication of Motorola Inc.
Communications and Electronics Division.

July-August, 1954

In this issue . . .

Pan American World Airways Simplifies Ground Operations at Idlewilde Airport with Two-Way Radio

Solar Power



D. E. NOBLE

There has been so much atomic battery and solar battery publicity of late, I thought this might be a good subject for comment. Either a sun-powered battery or an atomic battery to supply the power for remote radio installations would be extremely useful. The low-power demanding characteristics of a transistor provide new dimensions with which to work, and the development of standby receivers, equipped with transistors and powered by solar power, appears to be entirely possible. In the most favorable latitude, on a yearly average basis, approximately 200 Watts of power would be available for each square meter of horizontal earth surface. On a clear day in the southwest, each square meter receives approximately 350 Watts, as an average figure for a 24-hour day. The power available just outside the earth atmosphere is somewhat more than 1.3 Kilowatts per square meter, and as much as 1.1 Kilowatts peak power per square meter may be found at the earth's surface under favorable conditions. The average figure is more significant, since we must store some energy during sunlight periods to use during the nighttime.

There have been two announcements of barrier type cells, which, when illuminated with sunshine, will deliver electrical energy directly. Assuming that 5% of the sunlight power can be converted to electrical power, our peak power of 1.1 Kilowatts of sunlight would provide us with 55 Watts peak electrical power. On the 200 Watt yearly average basis, this 5% would give us 10 Watts, or on a 24-hour basis, 240 Watt hours. In unfavorable latitudes, the yield would be less than half this amount. Remember that this is power per square meter, and the cost of a square meter of a photosensitive barrier surface would be very large under present production methods.

Despite the modest beginning, it is easily possible to predict the use of such solar power conversion devices associated with suitable storage batteries for powering isolated radio reporting equipment, and particularly for the operation of forestry service receivers and transmitters, and automatic relay installations. While the use of this solar power source might not be very practicable with vacuum tube receivers of standard designs, one of the most interesting characteristics of the transistor is its ability to operate at phenomenally low power consumption, and this characteristic exploited in receiver design and in association with a zero standby transmitter will make a solar powered remote installation practicable.

There have been many suggestions for the use of solar energy. One of the most popular methods has been the use of heat cells providing means by which the sun shines through one or more layers of glass to be absorbed by a blackened metal surface, and thus to heat the air enclosed in the cell. Transformation from the hot air to electrical energy by means of thermopiles, or by the use of hot-air engines or steam engines and generators, is inefficient and costly, and so far, the heat collector approach has been limited largely to experimental house heating. This is not intended to be a treatise on the use of solar energy, since I wish only to point out that the development of the transistor has led to the development of the barrier type cell for the direct conversion of solar energy to electrical energy, and that it is highly probable in the next few years we may expect to use solar energy for very special isolated radio standby installations.

You know that the development of the transistor was an outgrowth of the progress in the solid state physics art. The knowledge of the solid state has lagged behind the development of the phyics of the liquid and gaseous states. We may look forward to phenomenal growth of new electronic approaches as it becomes possible to apply newly won knowledge from the solid state physics to the engineering development of specialized devices. Many scientists and engineers are convinced that the transistor is merely the first product of a new "solid state" era in the electronics field.

There has been a considerable amount of excitement about nuclear batteries. Presumably we could combine one of the barrier photo junctions with a supply of radioactive materials and utilize the radiation from these materials to supply us with the electrical power. This would free the device from the variability limitations associated with sunshine as a source. The need for radiation shielding and the dangerous handling of radioactive materials would introduce a large element of impracticability, and for some years to come, the cost would probably be prohibitive, and the power output discouragingly small. Some of us have suggested that ultimately the PN junction of a transistor will be combined with radio isotopes so that we will produce a transistor with its own built-in power source. I do not feel that it is unreasonable to look forward to the time when, by using self-powered transistors, we can design a receiver which will require no external battery or power source.

While I do not advise any of you to declare your present equipment obsolete on the basis of the suggestions for the future I have outlined above, I do feel that we have a most interesting and challenging road to follow for the next ten years.

Dan Noble

The

Motorola Newsgram

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Communications and Electronics Division

Technical Information Center

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County Radio Net To Help Co-ordinate Fire Fighting

Work is progressing on a $420,000 Motorola radio system to interconnect the City of Buffalo, N. Y., with 92 urban fire stations in surrounding Erie County. The turnkey project is to be completed by late spring.

Ten 60-watt area base stations will co-ordinate the mutual aid fire fighting of the 92 outlying companies. An unattended, fully automatic relay station located 14 miles southeast of Buffalo in Chestnut Ridge Park will connect the 10 area stations with Buffalo.

First phase of the contract—modernizing Buffalo's fire radio network for two-frequency operation—is nearing completion.

By use of Motorola "Quik-Call" selective signaling, any one or any combination of the 101 station receivers can be made to actuate sirens calling out the fire companies. The sirens can be controlled either from the area stations or from a master console located in Buffalo Fire Headquarters.

Erie County's new radio system will serve as a model for Civil Defense officials. In time of emergency, the master control console can aurally alert any area base station or urban fire station by means of the "Quik-Call" feature. Similarly, any area base operator can alert the master controller in Buffalo.

Goebel To Address Signal Association

Eugene S. Goebel, national sales manager for Motorola Communications & Electronics, Inc., has accepted an invitation to outline Motorola's policy toward equipment maintenance at the International Municipal Signal Association convention in Atlantic City, N. J., October 4-7.

He will point out that while Motorola strongly advocates ownership and servicing of radio equipment by the agency involved, such maintenance may be uneconomical for small cities. In these instances, Motorola will enter into contracts to maintain the radio systems at lowest possible cost.

Conference Will Hear 3 Engineers

Three Motorola engineers are to present papers early in October at the 10th National Electronics Conference in Chicago.

Kenneth Backman, senior development engineer, will speak on universal power supplies for vehicular radio, with emphasis on problems encountered during the changeover from 6 volt to 12 volt electrical systems. He will discuss precautions taken to avoid obsoleting existing equipment and explain how Motorola equipment works interchangeably from either voltage.

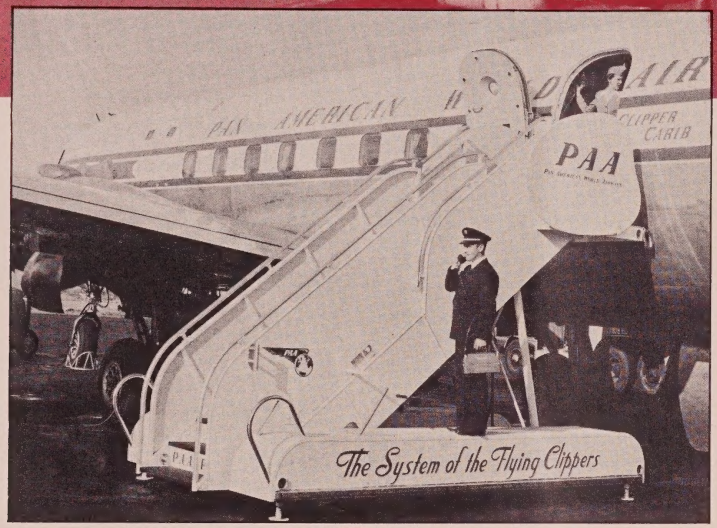
Dr. Robert E. Samuelson, chief engineer at Motorola's Phoenix Research Laboratory, will tell of "Engineering Management in a Growing Laboratory."

William Firestone, assistant chief engineer for research, is to discuss problems of modulation splatter, showing how a transmitter can interfere with a receiver tuned to another frequency, and relate steps Motorola is taking to overcome the problem.

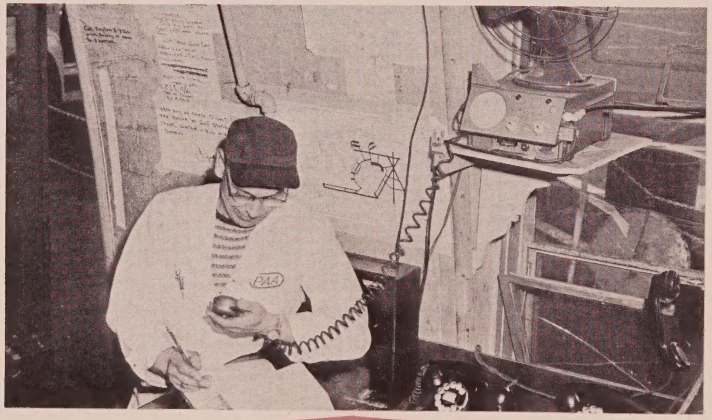
"It is unwise to pay too much, but it is worse to pay too little. When you pay too much, you lose a little money—that is all. When you pay too little, you sometimes lose everything, because the thing you bought was incapable of doing the thing it was bought to do. The common law of business balance prohibits paying a little and getting a lot. It can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run. And if you do that, you will have enough to pay for something better."

—John Ruskin.

ON TIME D



Operations Representative Harold McMullin uses a portable "Handie-Talkie" radiophone to advise Traffic Department that Flight #201 to Buenos Aires is ready for passenger loading.



Master Mechanic P. Metzger in the Line Maintenance Office radios a request to the hangar for a new magneto for one of Pan American's Boeing B-6 engines. System is licensed as Low Power Industrial.

Commercial aviation, long dependent on radio to guide its planes safely through the air, has come up with a new application for radio in its terminal operations.

Pan American World Airways, a pioneer in international overseas flights, was one of the first major airlines to install such a system. This terminal two-way radio system speeds ground operations preparing Clipper ships for overseas flights from New York's Idlewilde Airport.

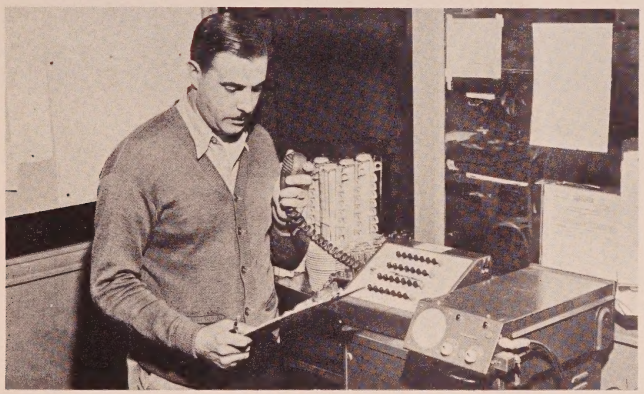
Five base stations, nine mobile units and "Handie-Talkie" portable radiophones tie all ground operations into a closely coordinated group. The base stations provide instant communications among the hangars, flight dispatching offices, the commissary and station operations. Three "Jeeps", a station wagon and five commissary vans are equipped with mobile units.

The commissary mobile units incorporate a special device known as "Quik-Call", which provides a means of selectively calling individual vans from the commissary office. A recall light on top of the van and controlled by "Quik-Call", lights to call the driver if he is away from the van when a message comes in.

Maintaining "on time" departures calls for close coordination among ground crews, and with two-way radio, Pan American has found the tool to get the job done.

EPARTURES

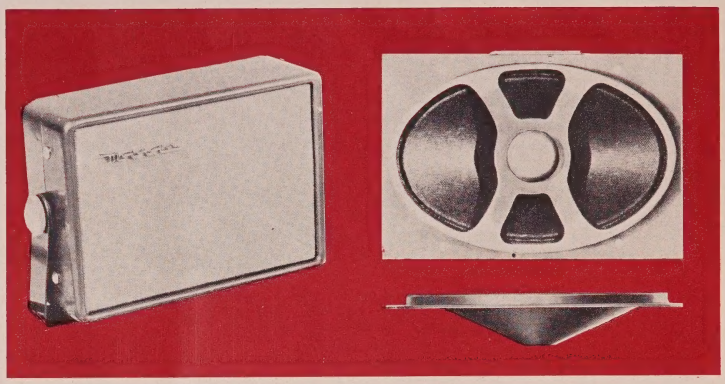
Operations Coordinating Clerk Ted Brown in Weights and Balances relays loading and cargo distribution data for one of Pan American's Stratocruiser flights to the ramp via two-way radio.



A. J. Mongelluzo, senior port steward, calls Van #15 from Commissary headquarters, requesting that additional food packages be placed aboard Flight #150 due to last minute passenger changes.

Since the hangars are located some distance from the passenger loading ramp, two-way radio between these points is vitally important. Here Shift Foreman Charles Bonnell in the hangar acknowledges an inquiry from the ramp.

NEW SPEAKER FOR 2-WAY RADIO . . .
. . . provides clearer messages



In order to improve intelligibility of messages, Motorola is now shipping as a standard accessory with all mobile two-way radio units, a new inverted cone speaker whose cone area is as much as 43% greater than that of speakers found in most present day mobile radios. Messages from feminine or even male dispatchers with unique voice characteristics will be easier to understand because the entire voice range transmitted is uniformly reproduced without erratic attenuation of particular voice frequencies. Advantages of this speaker will be particularly apparent in fringe reception areas and where ambient audible noise levels are high. This speaker is unique in that the magnet assembly is actually inside the cone in order to reduce volume requirements.

Because of the universal trunnion mounting used, this speaker also solves many of the mounting problems met as a result of the limited space available on vehicle firewalls. The trunnion, requiring a mounting area of 1 x 7" can easily be fitted in between heater ducts, etc., whereas flush mounted rectangular or square speakers in common use are often difficult to position on the crowded firewall. The speaker can also be mounted easily at any angle on the lip of the instrument panel, the side cowl or the rear deck of trucks.

The new speaker has a distinctively styled housing measuring only 8½ x 6¾ x 2¾" deep, including mounting bracket. Its water-resistant grill cloth, also made out of rayon flocked metal mesh effectively protects the speaker cone from splashing liquid and dust.

TRANSMISSIONS . . . On Communications Topics

Quick—The Water Pipe Is Leaking

The housewife who finds a water pipe leaking and the basement flooding will appreciate the fact that a number of plumbing contractors have equipped their service trucks with two-way radio to speed up service on repair calls, says the Plumbing and Heating Industries Bureau.

What Not To Do

We don't recommend that anyone try to beat the races by using a private radio hookup as did three men who were arrested in Pawtucket, R. I. Seems that one member of the trio stood near the starting gate at the race track and by means of a transmitter in his pants pocket and a tiny microphone in the palm of his hand would broadcast the number of the horse that broke from the starting gate first. His two partners, equipped with receivers, then would bet as much as they could on that horse in the few seconds between the start of the race and the closing of the mutual windows.

The trio was charged with violating FCC regulations by operating a radio station without a license. We're happy to report that, although most of the two-way radio equipment in use was made by Motorola, the equipment they used was NOT.

Even The Election Board Uses It

Contact between the St. Louis (Mo.) Election Board and roving deputy election commissioners checking polling places was maintained during a recent election by means of two-way radio. Three two-way radio equipped cars were assigned to the board by the St. Louis Police.

NEW Literature Available

Selective Telemetering

Information about power flow, generation, oil pressure, oil flow, bus voltage, and many other values is required for effective remote operation of substations, generating plants, pipe line pumping stations, etc. Yet most central control stations provide the operator with much less data than he would have if he were manning the remote station, for it is seldom economically feasible to continuously telemeter all such information.

A method that provides a satisfactory answer to this cost problem—selective telemetering—is described in detail in a technical Bulletin No. ATIC-929 recently issued by Motorola, Inc. Based upon a talk on "Selective Telemetering Applications" presented at the National Telemetering Conference by Leonard G. Walker and Dayton N. McMillan, it tells how a compromise can often be made to provide some information continuously while other data can be "selected" when needed by the operator. The shared use of telemeter communication channels with supervisory control systems not only reduces the original cost of transmitting equipment, but also cuts space requirements.

Supervisory Control

How to supervise and control the operation of equipment in remote, unattended locations without direct connection by multi-conductor cables is the subject of a new, 12-page Bulletin No. E109 entitled "Motorola Supervisory Control Equipment." It describes a system that can use VHF radio, microwave, power line carrier or wire line to transmit audio tones that will control electrically operated equipment such as circuit breakers, valves, pumps, motors, etc. The same system will also provide a continuous indication of the position of this equipment.

Aperiodic Coupling Units

Communication engineers for power utilities will be interested in a new, 8-page Bulletin No. E-108 on aperiodic line coupling units. These units are used to transfer energy from a carrier transmitter to the power line and from the power line to the carrier receiver. Being non-resonant, broad band coupling units, they pass all carrier frequencies above the lowest carrier frequency with minimum coupling loss. They are also employed for multi-frequency, multi-line carrier bypasses around circuit discontinuities.

Copies of the above described bulletins are available upon request from Motorola Communications and Electronics, Inc., National Sales Department.

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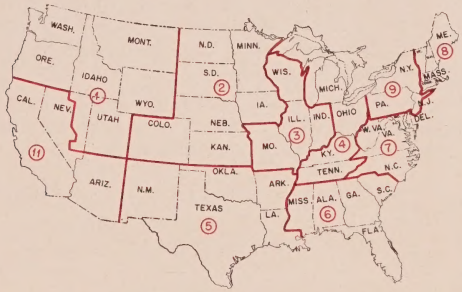

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ANOTHER MOTOROLA FIRST

NEW ALL TONE SUPERVISORY CONTROL

FOR HIGHER RELIABILITY

MAINTENANCE ECONOMY

SUPERIOR PERFORMANCE

More Reliable Supervisory Control offers a further means toward optimum utilization of man-power and helps alleviate the problem of men "going stale" on the job.

Motorola's new supervisory control system for remote operation of unattended apparatus, places *centralized control* at your load dispatcher's fingertips. It optimizes system coordination and efficiency and helps sustain operating profit at a higher level.

Accurate and reliable functioning of terminal apparatus is assured by coded signals from and to the central dispatch console. This all tone system utilizes any audio channel with *maximum security*. The signals go through the entire system unchanged and do not require synchronization or adherence to close time tolerances.

Exclusive multiple selection and simultaneous operation of remote apparatus at one or several stations is optionally possible without additional equipment for selecting and operating the combinations.

EXCLUSIVE ALARM MEMORY CIRCUIT—The important flashing alarm indication will always remain on the specific escutcheon until cancelled by *pulling* main reset key even though alarm bell and light are cancelled by alarm reset, or other points on systems are selected, operated and reset.

The Add-a-Point feature makes adequate provisions for future expansion of the system. A full complement of wiring in each relay case at the start so that additional point functions can be added easily and economically.

Other Exclusive Features

Maximum security with precision tone control by exclusive Motorola Vibrasenders and Vibrasponders.

Selection with position verification before operation.

Selection cannot interfere with reception of alarm indications.

Predetermined priority reporting of multiple stations.

Inexpensive duplicate lamp display for distant points.

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